

## 60039 - Security and industrial processes with laser

### Syllabus Information

**Academic Year:** 2020/21

**Subject:** 60039 - Security and industrial processes with laser

**Faculty / School:** 100 - Facultad de Ciencias

**Degree:** 538 - Master's in Physics and Physical Technologies  
589 - Master's in Physics and Physical Technologies

**ECTS:** 5.0

**Year:** 1

**Semester:** First semester

**Subject Type:** Optional

**Module:** ---

### 1.General information

#### 1.1.Aims of the course

#### 1.2.Context and importance of this course in the degree

#### 1.3.Recommendations to take this course

### 2.Learning goals

#### 2.1.Competences

#### 2.2.Learning goals

#### 2.3.Importance of learning goals

### 3.Assessment (1st and 2nd call)

#### 3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

### 4.Methodology, learning tasks, syllabus and resources

#### 4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. For this course the learning process is based on:

- Cooperative classroom techniques.
- Case studies and problem-based learning.
- Practical classes and laboratory demos.

#### 4.2.Learning tasks

The course includes the following learning tasks:

1. Classroom activities and active learning in the laboratory (40 hours).
2. Laboratory demos (10 hours):
  - Propagation and transformation of a laser beam according to safety rules.
  - Fusion processes and laser assisted ablation applied to material processing.

The teaching and assessment activities will be carried out in person unless, due to the health situation, the provisions issued by the competent authorities and by the University of Zaragoza arrange to carry them out on-line.

### **4.3.Syllabus**

The course will address the following topics:

1. Laser description. Technical specifications.
2. Optical characteristics and laser beam transformation.
3. Main type of lasers (description, characteristics, application).
4. Matter-Radiation interaction.
5. Laser systems in industrial processes.
6. Safety in laser environment.
7. Industrial processes.

#### **Laboratory activities**

- P.1. Laser beam propagation and transformation in accordance with laser safety standards.
- P.2. Laser assisted ablation and fusion processes applied to material processing.

### **4.4.Course planning and calendar**

The dates for the project presentations will be announced in advance and students will be expected to stay for all the presentations.

Further information concerning the timetable, classroom, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the Faculty of Science <http://ciencias.unizar.es/>

### **4.5.Bibliography and recommended resources**

[http://biblos.unizar.es/br/br\\_citas.php?codigo=60039&year=2019](http://biblos.unizar.es/br/br_citas.php?codigo=60039&year=2019)